USDA-ARS Grape & Wine Chemistry Program

Horticultural Crops Research Laboratory (Corvallis, OR; Prosser, WA; Parma, ID)
Principle Scientist: Jungmin Lee / Technical Staff: Chris Rennaker

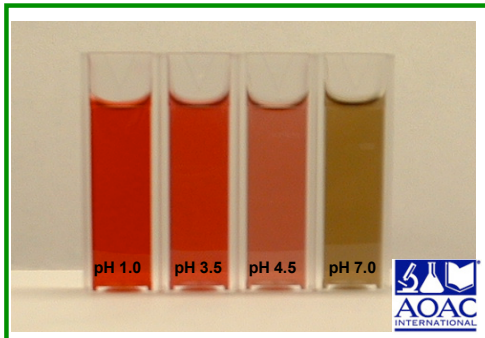
The USDA-ARS food and wine chemistry program in Parma, Idaho began in October 2004. Long-term objectives:

- To develop and validate methods that are simple, rapid, reliable, and reproducible for measuring the quality of fruit and fruit products.
- To understand the management of anthocyanins and polyphenolics, extraction of tannins, and oxidation during wine fermentation.
- To investigate how cultivar, vine physiology, cultural practices, plant diseases, and nutrients influence the chemical components of wine grapes and wines.

Analytical instruments in the lab:

- HPLC-DAD-ion trap MS
- GC-FID and MS
- HPLC-DAD, FLD, and RID
- Hunter Colorimeter
- Microplate Reader

. . . and more



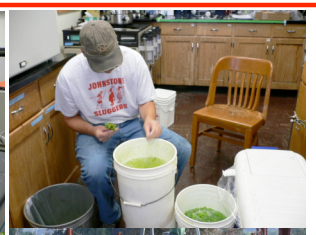
AOAC (Association of Analytical Communities) Official Method for determining total anthocyanins (AOAC method 2005.02):

The Pacific Northwest produces a wide range of fruits and vegetables. Many are processed into canned and frozen fruits, preserves, juices, and wines. Because colors (anthocyanins) are important indicators of quality, this standardized method fills the need for quickly determining total anthocyanins. The method is also applicable to products being marketed for the antioxidant capacity of their anthocyanins.

Chemical composition of commercially available Idaho wines :

42 wines from 12 wineries were assessed for chemical composition, the first such survey of Idaho-produced wines. Varietals included Cabernet Sauvignon, Merlot, Riesling, and Chardonnay.

Among the compounds measured were:
- Total stilbene content (*trans*-resveratrol, *cis*-resveratrol, *trans*-piceid, and *cis*-piceid)
- ORAC (Oxygen Radical Absorbance Capacity, or antioxidant capacity)
- Total anthocyanins (reds)
- Total phenolics
- Total tannins
- Color measurements (lightness, chroma, and hue)





Current projects:

Polyphenolics evolution in model wine systems and commercial wine (with Jim Kennedy, OSU and the Hogue Cellars).

Improve, modify, and develop **analytical methods** for quality indicating compounds (mainly phenolics).

The effect of early **seed removal during fermentation** on proanthocyanidin extraction in red wine (in cooperation with Willakenzie Estate Winery, OR and Ste. Chapelle Winery, ID).

Vine nutrients (N, P, and K) and irrigation, and Pinot noir grape quality indicators (with Paul Schreiner, USDA-ARS).

Grapevine leafroll associated virus (GLRaV) and Pinot noir grape quality components (with Bob Martin, USDA-ARS).

Cover crop, tillage, and rootstock, and Cabernet Sauvignon grape quality (with Kerri Steenwerth, USDA-ARS).

Berry **skin temperature** on Merlot grape anthocyanin development (with Julie Tarara and Carolyn Scagel, USDA-ARS).

Scientific Collaborators and Industry Cooperators:

- Collaborators: Julie Tarara (USDA-ARS), Paul Schreiner (USDA-ARS), Bob Martin (USDA-ARS), Kerri Steenwerth (USDA-ARS), Chad Finn (USDA-ARS), Carolyn Scagel (USDA-ARS), Kim Hummer (USDA-ARS), Jim Kennedy (OSU), Ron Wrolstad (OSU), Jordan Ferrier (the Hogue Cellars), Dominique Mahe (Willakenzie Estate Winery), and Chuck Devlin (Ste. Chapelle Winery).
- University of Idaho Parma Research and Extension Center.
- Students: Michael Dossett (OSU), Seth Cohen (OSU), Nicole Umiker (WSU), and Sam Kamo (Vale high school).